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Path Analysis of the Effect of Academic Emotions in Academic Achievement of Nursing Students of Zanjan University of Medical Sciences in the 2018-19 Academic Year through the Mediation of the Academic Engagement and Cognitive Strategies

Masoumi Jahandizi H[1], Hejazi M[2*], Ahmadi MS[3], Vakili MM[4]

[1]PhD student, Department of Psychology, Zanjan Branch, Islamic Azad University, Zanjan, Iran
[2]Department of Psychology, Zanjan Branch, Islamic Azad University, Zanjan, Iran
[3]PhD of Educational Psychology, Zanjan Farhangian University, Zanjan, Iran
[4]Department of Health Education and Health Promotion, School of Paramedical & Health, Zanjan University of Medical Sciences, Zanjan, Iran

Corresponding Author: Department of Psychology, Zanjan Branch, Islamic Azad University, Zanjan

Email: masoud.hejazi@iauz.ac.ir

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Abstract

Background: Identification of the factors that result in academic achievement and prevent academic failure is of extreme importance due to the effective role of nursing in the health and wellbeing of human beings.
Objectives: This study is done with regards to the important role of academic emotions in academic achievement and the double effect of academic engagement mediators and cognitive strategies in the process; Therefore, the focus of this investigation is the influential role of academic emotions in academic achievement of the nursing students of Zanjan University of Medical Sciences through mediation of academic engagement and cognitive strategies.
Methods: This research is causal-comparative in nature, covering a statistical population of 178 male and female students of nursing in Zanjan University of Medical Sciences, who were found qualified for this study. Questionnaire was used as an instrument for collection of data, which was then analyzed using SPSS24 and LISREL 8.8.
***Results*:** The findings showed that academic engagement with a coefficient of 0.58 and cognitive strategies with a coefficient of 0.22 mediated academic achievement and academic emotion. Moreover, the adequacy of the model was above 0.90 through the Goodness-of-Fit Indices. Moreover, the adequacy of the model was proved through such Goodness-of-Fit Indices as the Chi-square test, which equaled 6.12, the six degrees of freedom (6DoF) and the 0.40 level of statistical significance (p).
Conclusion: Therefore, it is concluded that mediation of academic engagement and cognitive strategies will enhance effect of academic emotion in academic achievement and the variables have well proved their mediation role.

Keywords: academic emotion, academic achievement, engagement and cognitive strategies, nursing students

Introduction

The grave role of nursing in guaranteeing social wellbeing, the stressful nature of the nursing job and discipline and ever growing problems of the students, make it imperative to look into different dimensions of their education, including factors leading to their progress and academic performance. Exploration of the risk factors and using favorable and efficient methods to remove the factors are among main duties and responsibilities of the nursing university officials and instructors [1].

Academic achievement should be defined as the outcome of assessment of the performance of the learners and comparing the results and the pre-determined academic objectives so as to make due

decisions on educational activities of the teacher and see to what extent students' efforts have been effective to reach the favorable goals [2]. Based on findings of a study regarding condition of education in Iran, academic dropout represents a serious problem: About 13% of students in the first academic year suffer academic dropout [3]. This makes investigation of the factors leading to academic achievement necessary.

Academic engagement has a crucial effect in academic achievement because learners seem to experience different types of emotion under different academic conditions. Academic emotions are defined as those that are directly observed in academic activities or academic outcome. Such a definition governs the belief that the emotions that have something to do with academic education are regarded as academic emotions [4].

Among other factors that have an influence in academic achievement should be mentioned as academic engagement, which is an instance of emotion referring to the amount of energy a learner spends on his/her academic work, as well as the degree of effectiveness and efficiency thus obtained. Academic emotion is occasionally applied as a motivational structure that is reflective of the learner's commitment to education. [5] Student academic emotion should be regarded as an important mediator of academic achievement, social behavior, and educational continuity [6]. A study showed that students, characterized by high level of academic emotion, had lesser experience of academic burnout [7]. Furthermore, another study pointed to the fact that through academic engagement, academic self-efficacy attitudes affected students' wellbeing either directly or indirectly [8]. Veis Karami et al. showed that direct classroom social-psychological atmosphere had 29% effect directly and 32% effect indirectly through the mediation of academic engagement, well proving the effect of academic engagement in academic achievement [9]. Moreover, a study showed there is a positive relationship between academic achievement and academic performance [10,11].

Another factor that can influence academic achievement is cognitive strategies. Cognitive strategies include repetition, elaboration (note taking), summarizing, organizing, and understanding of the content that is needed for effective learning [12]. In a study using Pearson correlation test, it was found that there is a significant relationship between students' average and average cognitive ability [12]. The results showed that after the cognitive strategies' training, the mean score of the experimental group in both sexes was significantly increased compared to that of the control group [13]. One study found that teaching cognitive strategies had an impact on better academic performance, academic achievement, and learners' engagement beliefs [14,15].

Methods

This study is causal-comparative in nature and employs the Structural Equation Modeling (SEM) to evaluate the relationships between the present variables and measure them in the proposed conceptual model.

The statistical population of this study included all male and female nursing students of Zanjan University of Medical Sciences in the academic year 2018-19 who were identified to be qualified to take part in this study (with a semester grade point average). Due to the availability of the statistical population sampling was not done and all subjects (178 people in all) were studied and there was no sample mortality. In this study, the following instruments were used to collect information and data:

1. Demographic questionnaire
2. Academic Engagement Questionnaire of Frederic et al. (2004)
3. Achievement Emotions Questionnaire (AEQ) of Pekrun et al. (2005)
4. The Motivated Strategies for Learning Questionnaire (MSLQ) of Pintrich and De Groot (1990)
5. First semester grade point average of the participants in the 2018-19 academic year. In the case of path analysis (Jöreskog and Sörbom, 1995) [16], Frederic et al.'s (2004) standard questionnaire of Academic Engagement contains 15 items and is rated on a five-point Likert scale (its item choices range from `Never' to `Always') with such questions as: "I'm attentive in class; I pretend to be active when present in class". They measure academic engagement. Questions 1, 2, 3, and 4 relate to the Behavioral engagement subscale, and questions 5, 6, 7, 8, 9, 10 relate to emotional engagement, while questions 11, 12,

13, 14, and 15 relate to the cognitive engagement subscale. The reliability and validity of this questionnaire were confirmed by Sarmad et al. (2011) and Abbasi et al. (2015) [17,18]. The reliability of the questionnaire was obtained using Cronbach's alpha which stood above 0.70. To measure students' academic achievement, the students' semester grade point average was taken into consideration.

To evaluate academic emotion, the Academic Excitement Questionnaire Pekrun (AEQ2005) was used. The questionnaire has 43 questions and seven components, measuring academic emotion based on the five-point Likert scale. The Cronbach's alpha coefficient was calculated for this questionnaire, which equaled 0.07. Reliability of class-related emotion scales were 0.74 for class pleasure, 0.76 for class hope, 0.74 for class anger and 0.84 for class fatigue, while Cronbach's alpha coefficient, calculated for class pleasure, hope , anger, and fatigue, were 0.92, 0.89, 0.88, and 0.93, respectively, while registering high and acceptable reliability [19]. To evaluate the validity of the instruments, the historical background of using these tests and their frequent use in numerous studies were cited in this study.

To measure cognitive strategies, the Motivated Strategies for Learning Questionnaire (MSLQ) of R. Pintrich and Elisabeth V. De Groot (1990) was used (MSLQ 1990). The questionnaire consists of 47 items, well divided into two parts: motivational beliefs and self-regulated learning strategies (cognitive and metacognitive strategies). The subscale of self-regulated learning strategies consists of 22 items, pretty measuring three aspects of academic self-regulation namely cognitive strategies, meta-cognitive strategies and resource management. Cognitive strategies have 13 scale items as follows: Repetition and Review, including statements number 29, 37 and 44; elaboration, consisting of the note taking of 34 statements; summarizing, consisting of summarizing the statements number 31 and 45; organizing, consisting of organizing the statements number 26, 27, 39, 42 and 47 and comprehending, consisting of comprehending the statements number 32 and 33. Regarding the present study objectives, only the cognitive sub-scales of the questionnaire are case specific, thus being excluded from other sections [20]. In this study, the reliability of the research tools was calculated using Cronbach's alpha index and was 0.83 for academic engagement, 0.77 for academic emotion of Pekrun. Pintrich and DiGruth self-regulation learning strategies were proved to be at the level of 0.80.

In the present study, first semester grade point average was used to evaluate academic achievement. Standardized questionnaires were used for data collection. A field survey was conducted to fill up the questionnaire, i.e. in addition to documentary work such as collecting materials from books, articles and scientific journals, a research community and sample were also selected. For the purpose of data collection, after obtaining permission from Zanjan University of Medical Sciences and reproducing questionnaires, the researcher referred to colleges. When distributing the questionnaires to the students, they were assured of confidentiality of the individual scores in the tests. After completing the testing process and taking the first semester grade point average of the samples in the first semester of the academic year 2018-19, each test was corrected and scored according to the relevant rule.

The collected data were analyzed in two descriptive and inferential sections, using the SPSS24 and LISREL8.8 software. Such descriptive tools as central tendency and dispersion indices (frequency distribution tables, percentages, averages, standard deviations, skewness, maximum and minimum) were used to describe the research data, thus afford clarification of the topic. Kolmogorov-Smirnov test was used toevaluate the normality of the data so as to deduce inferential data and find out relationships between variables in structural equations. The distribution of data proved to be higher than 0.05 level of significance. Thus, normality of the data was confirmed.

The adequacy of the model was confirmed by the goodness-of-fit indices as are presented in Table 2. Then, the relationship between variables was analyzed by the path analysis method.

Results

Out of 178 nursing students taking part in this study, 48.3% were male and 51.7% were female. The mean age of the group was 21.1 years, busy studying in the academic year 2018-19. Figure 1 shows the variables based on which the data was

analyzed, aiming to predict academic achievement.

Table 1: Frequency Distribution of Study Samples in the Medical and Nursing Groups in Proportion to certain Demographic Variables (Zanjan University of Medical Sciences in 2018-19 Academic Year)

Variables		Nursing	
		Number	**Percentage**
Sex	Male	86	48.3
	Female	92	51.7
Marital Status	Single	161	90.45
	Married	17	9.55
Age	Mean Age	21.1	-
	Standard Deviation of the Age	1.9	-

Table 2: Grade Point Average of Nursing Students' Cognitive Strategies, Academic Engagement and Academic Emotion in Proportion of Dimensions

	Variable	**Average**	**SD**
Cognitive Strategies	Repetition and Review	9.85	1.86
	Extension including Note Taking	3.5	1.17
	Summarizing	7.32	1.53
	Organizing	18.29	2.98
	Comprehension	7.76	1.24
	Total	46.76	6.24
Academic Engagement	Behavioral	12	1.75
	Affective	19.2	3.93
	Cognitive	14.47	3.83
	Total	45.7	7.55
Academic Emotion	Pleasure	16.2	3.42
	Pride	18	3.23
	Anxiety	12.2	3.67
	Shame	20.7	6.3
	Anger	10.69	3.20
	Disappointment	8.65	3
	Fatigue	30.69	8.26
	Total	117.39	18

To evaluate the data based on path analysis model, LISREL 8.8 (16) software was used. Model adequacy through the Goodness-of-Fit Indices in the final model, such as the chi-square test equaled 6.12, while the degree of freedom was 6, the level of significance was 0.40. Other findings were: RMSEA=0.1; NNFI=1, CFI=1, GFI=.99 and AGFI=.97 (see Table 3). Veira suggests that when the goodness-of-fit indices are higher than 0.90, they will serve as evidences of acceptance of the model [21].

A. Initial Hypothetical Model

Figure 1 shows the conceptual model:

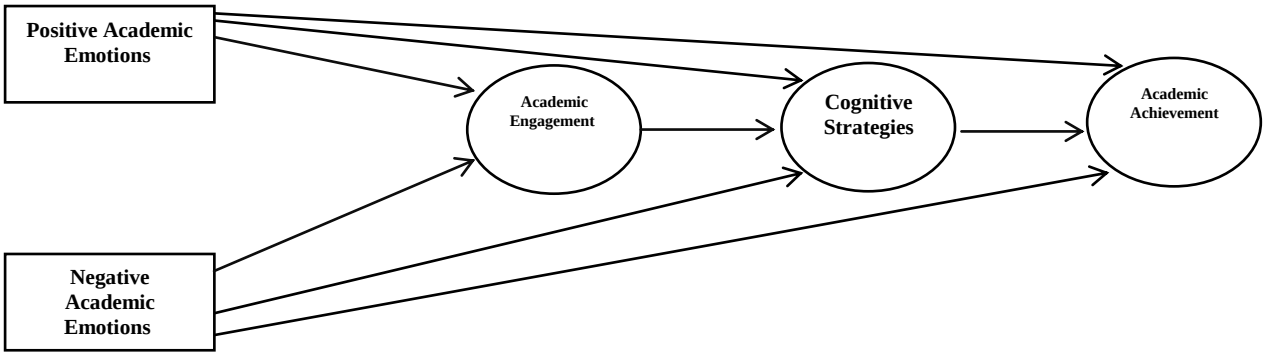


Figure 1: Conceptual Model

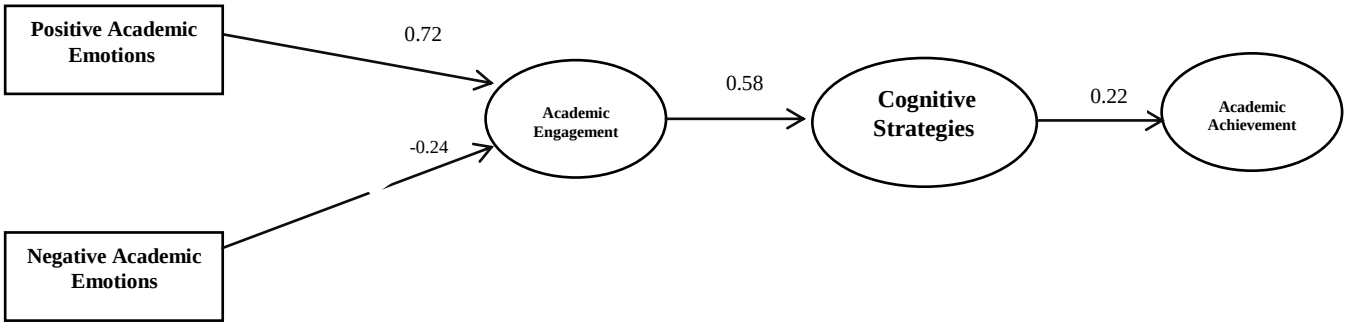
Final Model

Figure 2 shows the model, obtained from path analysis after eliminating non-significant relationships. The model was confirmed by the Goodness-of-Fit Index (GFI) confirmed once applied to LISREL. Table 2 well illustrates that the chi-square is not significant and the GFIs are all higher than 0.90. Therefore, the model is approved.

Table 3: Goodness-of-Fit Indices of Final Model

Chi-Square =6.12	**d f =6 , P =.40**
RMSEA=.01	
NNFI = 1	
CFI = 1	
GFI = .99	
AGFI = .97	

As figure 1 demonstrates that none of the exogenous independent bivariates could predict the dependent variable (academic achievement) directly. However, they could predict the academic achievement variable through mediation of the academic engagement and cognitive strategies.



- All the coefficients are meaningful at the 0.05 level of significance. The non-

Figure 2: Standard path coefficients

The direct and indirect effects of the paths: The path model is distinguished by two types of effects: Direct and indirect effects. When an exogenous variable draws a path (arrow) towards

the dependent variable, it is said to have direct impact on that dependent variable. When one exogenous variable affects dependent variable through another endogenous variable (mediator), it is said to be an indirect effect. The total effect is the sum of the direct and indirect effects. The values that indicate the direction and magnitude of the impact of the variables are called path coefficients. The path coefficients less than 0.30 are considered weak coefficients, while those being higher than that are regarded as acceptable. The path coefficient powered by two and multiplied by 100 will give the coefficient of determination (denoted by R2), which is actually defined as the variance percentage. What follows are the direct and indirect effects of the paths. The direct effects are illustrated in Figure 2. Indirect effects are calculated this way:

The Path of Positive Emotions to Academic Engagement to Cognitive Strategies to Academic Achievement

$(0.72)\times(0.58)\times(0.22)=2.1$

The Path of Negative Emotions to Academic Engagement to Cognitive Strategies to Academic Achievement

$(0.72)\times(0.58)\times(0.22)=-0.03$

Total effect:

$0.1+-0.03=0.07$

Discussion

This study aims to see whether there is any relationship between Academic Emotions and Academic Achievement of the nursing students of Zanjan University of Medical Sciences through mediation of engagement and cognitive strategies. The study uses a model of structural relationships to define academic achievements and find out their representation in the students' achievements. The study examined direct and indirect relationship among variables of the tests as the proposed model testified fitted well with the data. Actually, the external variables had positive impact on academic achievement under the influence of related academic achievement. The results well aligned with the patterns and models relating to academic achievement. The results of this study showed that academic engagement mediated academic achievement and academic emotion. The finding was well in direction with results of the studies of Azimi et al. [22].

Furthermore, results of research conducted by Safari et al. showed that the students having high academic engagement were more interested in spending time and enough efforts on handling their assignments and doing studies. They are also more efficient and persistent in facing problems and issues on the way [23]. Zolali demonstrated that academic engagement encourages more academic motivation, well coming along with results of this study (24).

To elaborate more on the issue, it should be said that academic engagement is a multidimensional structure, consisting of the cognitive, motivational and behavioral components. Therefore, cognitively speaking, academic engagement prompts students to use diversity of the cognitive and metacognitive strategies in the learning process. On the other hand, speaking from behavioral point of view, academic engagement encourages the learners to make more endeavors, exercise perseverance and seek others' help when carrying out assignments. The academic engagement in turn makes academic environment highly interesting for the students, further encouraging them cognitively to enhance their cognitive engagement within framework of the academic and scientific framework. This protects students against such negative positions as academic burnout and fatigue, eventually leading to academic achievement.

Furthermore, the affective-cognitive engagement in education and academic environment leads to intrinsic motivation, resulting in the student thinking less of the product (scores) and paying more attention to the process instead. S/he would fear of failure less, becoming hesitant in making decisions and thinking of goals.

It can be concluded that such academic engagement parameters as the cognitive, motivational and behavioral strategies have resulted in academic achievement of the nursing students of Zanjan University of Medical Sciences. The findings of the present study revealed that cognitive strategies are effective in academic achievement, mediating the progress. The results well coordinate with those of Girin Miller et al. [25]. Moreover, the results are well aligned with the results of research by Ghadampour et al., showing that teaching cognitive strategies, raises the average score of academic hope of the experimental groups in a

meaningful way compared to that of the control group [15]. The findings of this research are also consistent with the findings of a study by Ghassemi Qeshlaq et al. (2018): Teaching cognitive strategies has positive impact on problem solving, numerical memory and math self-efficacy [26]. As a testimony to the finding, let's claim that efficient use of the cognitive strategies is the most important factor causing academic success because cognitive strategies mark a learning mechanism, facilitating learning and improving academic achievement of the learners.

Providing extended reasons, once getting accustomed to the cognitive strategies, students find sufficient time to manage learning; memorize points better using cognitive strategies; and act more purposefully when studying and learning; consequently, they win better scores in exams and have a better feeling of being qualified; they also show higher level of self-efficacy, which would result in growing success. This study is similar to the findings as its lays seal of approval to the subject of the research. Therefore, it can be concluded that the nursing students, taking part in this study, had a high level of awareness and information of the cognitive strategies and used them well in the study and learning processes. They are well aware of the skills and can face the subject purposefully, using appropriate learning mechanisms. They can even change their strategies when needed, thus becoming successful in their academic study. This study observed all ethical issues as willful consent and confidentiality of the opinions of the participants. No instance of sample mortality and restriction was observed whatsoever.

The study findings provide valuable information on the relationship between academic emotions and academic achievement mediated by cognitive strategies and engagement of students. However, certain limitations of this study restrict generalization of the findings: 1. this study is transitory in nature; therefore, it is impossible to make causal and caused conclusions based on the findings. 2. Like other studies, findings of this study might encourage the participants to use social confirmation methods due to the self-reported nature of the instruments used. 3. Regarding the fact that present study samples only represent students of Zanjan University of Medical Sciences, therefore, generalization of the findings to a larger population should be made with caution. Regarding the findings and the role of academic engagement and cognitive strategies in predicting students' academic achievement, more studies are suggested to concern different educational fields and other students in different academic levels in different parts of the country because teaching mechanisms of growth or increasing the psychological capital and raising academic engagement and cognitive strategies would provide a helpful program for academic achievement of students.

Cognition and academic engagement well mediate academic achievement and academic emotion of the nursing students of Zanjan University of Medical Sciences. It can be employed for further academic achievement of students. In this study academic engagement and cognitive strategies well proved their mediational role and mediated academic achievement and academic emotion; therefore, the officials in charge of education and the university instructors are recommended to take the points into consideration when planning promotion of abilities and academic achievement of the students. Regarding the importance of the variable of cognitive strategies in academic achievement, the cultural affairs departments in universities are suggested to use well experienced and the most qualified instructors to help students' academic achievement progress.

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Conflict of interest

The authors of this article declare that there is no conflict of interest in writing this article.

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